# Environment & Climate:

# A Teaching Toolkit

## Ocean Acidification – Part 2

This Learning Experience was created by Atlantic Canadian educators

YouCAN! Youth Climate Action Now | TuPEUX! Action jeunesse pour le climat

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# Educator Checklist

An educator checklist is provided with each learning experience to support educators to reflect on the depth of inquiry, pedagogical reflection and the skills continuum.

## Depth of Inquiry

- ☐ Structured: learners follow the lead of the educator as the whole class works through the inquiry process
- ☐ Controlled: educator selects topics and identifies resources learners will use to investigate questions
- ☐ Guided: educator choose topics and questions and learners design a product or solution
- ☐ Free: learners choose how they want to explore the outcome

## Reflection

- ☐ Have I accommodated for the diverse learners in my classroom? How?
- ☐ Have I considered culturally relevant pedagogy? How?
- ☐ Are there opportunities to collaborate with our community?
- ☐ Where are the opportunities for assessment?

## Skills Continuum

What skills will be implemented in the learning experience:

- ☐ Create
- ☐ Construct
- ☐ Plan
- ☐ Implement
- ☐ Reflect
- ☐ Evaluate
- ☐ Formulate
- ☐ Problem Solve
- ☐ Test
- ☐ Analyze
- ☐ Classify
- ☐ Compare
- ☐ Apply
- ☐ Investigate
- ☐ Question
- ☐ Select

Notes:

# Preparing for the Learning Experience

## Minimum Time Required: 1 hour

## Background

Climate change and the increase of Greenhouse gases has had a great impact on oceans and those who live within it. Ocean acidification is just one of the effects increased by climate change. Unfortunately, many creatures especially shelled sea creatures are greatly affected by ocean acidification. Learners explore and observe the impact of increased acid in water and what the acidification of shells really looks like. Learners leave having a better understanding of what that not only means for the shelled animal but those who rely on them.

## Key Vocabulary and Concepts

- ocean acidity
- acidification
- waterways
- acidity
- pH levels
- bases
- interconnectiveness
- oysters

## Materials

- variety of shells (eggs, beach shells)
- variety of acids (vinegar, lemon juice)
- jars
- distilled water

## Safety

Learners will be using jars, shells, and acids. Discussion pertaining to safety should take place before beginning. Gloves and safety goggles should be considered when handling any acid, whether lemon juice, vinegar or stronger.

# Facilitating the Learning Experience

## Spark and Driving Question

(What would grab learner's attention/ interests?)

- Watch "What is Ocean Acidification" video: https://www.youtube.com/watch?v=gZGj0BbDT38
    - Learners will be introduced to ocean acidification, what it is and what is causes.
- Learners are provided a variety of acids and shells to explore the effects of acidification on shells and shelled animals.
- Educator can facilitate discussions that lead to driving questions and conversation around acids, bases and shells.

## Idea and Plan Creation

(Learners make their plan)

- Learners choose how to test acidification on the shell.
- Learners choose the acidity level by lowering the pH level of the water using an acid* such as vinegar.
- Learners can choose to fill their jar with various ratios of diluted acids.
- Learners are encouraged to build their own graphic organizer and table to collect their data.

## Active Inquiry

(Learners actively explore and participate)

- Learners are supplied with:
    - jar
    - distilled water
    - acid (vinegar)
    - shell (egg)

- Learners add amount of distilled water and/ or acid from their plan.
- Learners record their observation of the shell at set intervals
- Learners share their observations and notes.

## Understanding and Communication

(Putting all the learning together)

- Compare observations with other learners.

## Sharing Knowledge and Future Application

(Acting on it and extension opportunities)

- Watch Oyster Farmers and Ocean Acidification video: https://www.youtube.com/watch?v=QRmWXKbKQYw
    - Learners can watch this video to understand how ocean acidification can affect living and non-living things such as oysters in a habitat similar to oyster farms in Nova Scotia.
- Reflect and discuss:
    - Impacts on communities and food sustainability
    - Using what you have learned, make a new action plan.

# Learning Experience at a Glance

| Spark and Driving Question | Idea and Plan Creation | Active Inquiry | Understanding and Communication | Sharing Knowledge of Future Application |
|---|---|---|---|---|
| What would grab learners' attention/ interest? | Learners make their plan | Learners actively participate and contribute to their own learning | Putting all the learning together | Acting on it and finding extension opportunities |
| Watch "What is Ocean Acidification video" https://www.youtube.com/watch?v=gZGj0BbDT38<br><br>Learners are provided a variety of acids and shells.<br><br>Facilitated questions and conversation | Learners choose how to test acidification on the shell.<br><br>Learners choose the acidity level by lowering the pH level of the water using an acid* such as vinegar. | Learners are supplied with:<br>- jar<br>- distilled water<br>- acid (vinegar)<br>- shell (egg)<br><br>Learners add amount of distilled water and/ or acid from their plan. | Compare observations with other learners. | Watch "Oyster Farmers and Ocean Acidification" https://www.youtube.com/watch?v=QRmWXKbKQYw<br><br>Reflect and discuss:<br>Impacts on communities and food sustainability<br><br>Possible learning extension:<br>Using what you have learned, make a new action plan. |

| | | | | |
|---|---|---|---|---|
| around acids, bases and shells. | Learners can choose to fill their jar with various ratios of diluted acids. | Learners record their observation of the shell intermittently.<br><br>Learners share their observations and notes. | | |
| Resources and Materials | Resources and Materials | Resources and Materials | Resources and Materials | Resources and Materials |
| Video<br><br>Variety of:<br>Shells<br>Acids | | jars<br>distilled water<br>acid (vinegar)<br>shell (egg)<br>notebook<br>pencils | | |

# Cross-Curriculum Outcomes

| Provincial Curriculum: Nova Scotia Provincial Curriculum *Grade 7 & 8 Renewed | |
|---|---|
| Grade | Science |
| 7 | **Learners will analyze particle theory in relation to substances in environments.**<br><br>**Learners will analyze the interconnectiveness of living things and the environment, in relation to the concept of Netukulimk.**<br><br>**Learners will investigate factors that affect species adaptation and evolution.**<br><br>***Learners will analyze factors that affect coastline change.** |
| 8 | Learners will analyze how the characteristics of cells relate to the needs of the organism.<br><br>Learners will evaluate oceanographic and other evidence of climate change inclusive of Mi'kmaw perspective. |

# Atlantic Canada Curriculum Connections

**New Brunswick:**
https://www2.gnb.ca/content/gnb/en/departments/education/k12/content/anglophone_sector/curriculum_anglophone.html

**Newfoundland & Labrador:**

https://www.gov.nl.ca/education/k12/curriculum/guides/

**Prince Edward Island:**

https://www.princeedwardisland.ca/en/information/education-and-lifelong-learning/programs-of-study